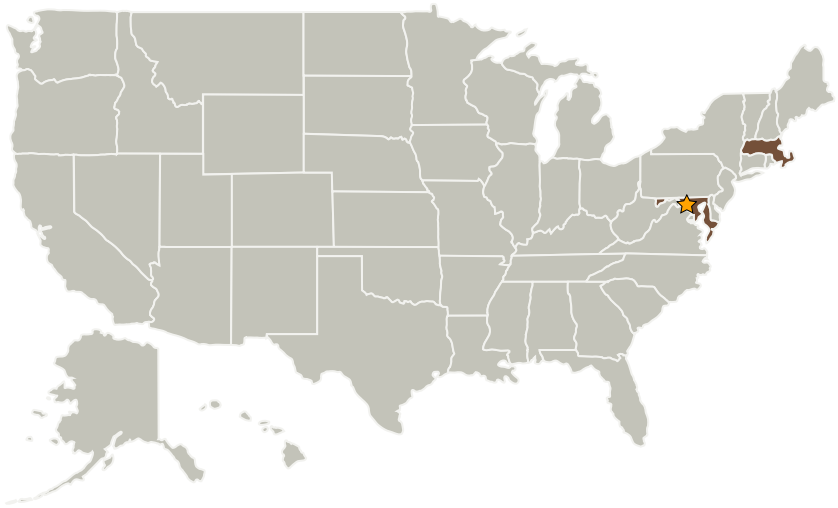
High Quality, Low-Scatter SiC Optics Suitable for Space-based UV & EUV Applications, Phase II

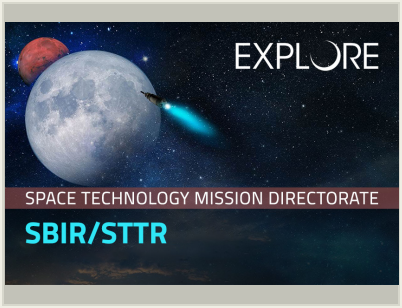
Completed Technology Project (2003 - 2005)

Project Introduction

SSG Precision Optronics proposes the development and demonstration of a new optical fabrication process for the production of EUV quality Silicon Carbide (SiC) optics. The process combines three technologies to provide a cost and schedule effective solution for lightweight, thermally stable precision optics for EUV applications. First, near-net-shape cast SiC materials for monolithic lightweighted, SiC mirror substrates with minimal machining required. Second, a thin CVD SiC sputter deposition process applied to the mirror facesheet. This enables a low-scatter surface as well as high reflectance in the EUV band. Third, the application of Tinsley?s computer controlled optical surfacing (CCOS) grinding and polishing makes it possible to generate aspheres with extremely accurate surfaces. The manufacturing process proposed allows production of state-of-the-art SiC aspheric mirrors with numerous benefits compared to competing technologies and traditional processes: ?Excellent Surface Figure Accuracy (<0.01 waves RMS, over low and mid-spatial-frequency measurements); ?Ultra-low micro-roughness (<10 Angstroms RMS routine, <1 Angstrom RMS achievable); ?Improved yield; ? Very low areal densities (~10 kg/m2 at an aperture of 1 meter); ?Superior thermal stability (SiC bulk material properties); In Phase 2, SSGPO will demonstrate an optimized optical fabrication process by producing a SiC EUV flight-ready optic.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
SSG Inc	Supporting Organization	Industry	Wilmington, Massachusetts

Primary U.S. Work Locations	
Maryland	Massachusetts

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Project Manager:
Dave Content

Principal Investigator:
Jay Schwartz

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.8 Measurement and Control